

REMARKS

Claims 1-3, 5-9, and 11-16 are pending in this application. By this Amendment, claims 1 and 8 are amended. Support for the amendments to the claims may be found, for example, in the specification at page 6, lines 1-5; page 11, lines 5-14; and page 29, line 26 to page 30 line 6. No new matter is added.

Entry of the amendments is proper under 37 CFR §1.116 because the amendments:

(a) place the application in condition for allowance (for the reasons discussed herein); (b) do not raise any new issue requiring further search and/or consideration (as the amendments amplify issues previously discussed throughout prosecution); (c) satisfy a requirement of form asserted in the previous Office Action; (d) do not present any additional claims without canceling a corresponding number of finally rejected claims; and (e) place the application in better form for appeal, should an appeal be necessary. The amendments are necessary and were not earlier presented because they are made in response to arguments raised in the final rejection. Entry of the amendments is thus respectfully requested.

I. Rejection under 35 U.S.C. §112, Second Paragraph

The Office Action rejects claims 1-3, 5-9, and 11-16 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. By this Amendment, claims 1 and 8 are amended in light of the Examiner's comments. Support for the amendments to claims 1 and 8 may be found, for example, in the specification at page 6, lines 1-5; page 11, lines 5-14; and page 29, line 26 to page 30 line 6. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

II. Rejections Under 35 U.S.C. §103

The Office Action rejects claims 1-3, 5-9, and 11-16 under 35 U.S.C. §103(a) over U.S. Patent No. 6,956,098 to Summers et al. (hereinafter "Summers"); rejects claims 1-3, 5,

7-9, and 11-16 under 35 U.S.C. §103(a) over U.S. Patent Application Publication No. 2001/003020122 to Hara et al. (hereinafter "Hara"); rejects claims 1-3 and 5-7 under 35 U.S.C. §103(a) over U.S. Patent No. 6,956,098 to Watanabe et al. (hereinafter "Watanabe"); rejects claims 1-3, 5-9, and 11-16 under 35 U.S.C. §103(a) over U.S. Patent No. 6,824,827 to Katsuki et al. (hereinafter "Katsuki"); and rejects claims 1-3, 5-9, and 11-16 under 35 U.S.C. §103(a) over U.S. Patent Application Publication 2006/0115670 to Tanaka et al. (hereinafter "Tanaka"). Because the Office Action's characterization of the claimed invention is erroneous and the applied references fail to teach, suggest, or establish any reason or rationale to provide the distinct structural features of claim 1 and the process steps of claim 8, Applicants respectfully traverse the rejections together.

Independent claim 1 recites in-part:

...at least one or more kind of element selected from Si, Ti, and Al are contained in an organic substance from the joining interface toward the metal layer, and the metal layer is formed on the thermoplastic film layer by a vapor deposition method.

Independent claim 8 recites in-part:

...forming a thermoplastic film containing thermoplastic on one side or both sides of the plastic film layer as a base body; and thereafter forming the metal layer on the thermoplastic film layer by a vapor deposition method wherein before the metal layer is formed, an organic substance containing at least one or one kind of element selected from Si, Ti, and Al is deposited on the thermoplastic film layer.

The applied references fail to teach, suggest, or establish any reason or rationale to provide, such a combination of features, as recited in claims 1 and 8, for the reasons discussed below.

Applicants respectfully submit that both the metal-coated substrate of claim 1 and the method of claim 8 avoid the drawbacks of decreased adhesion between the metal layer and the polyimide film occurring in the teachings of the applied references because the claimed method and metal-coated substrate result in molecules of the at least one or more kind of

element selected from Si, Ti, and Al contained in an organic substance existing from the surface of the thermoplastic film layer *toward the inside of the metal layer*, which is formed on the thermoplastic film layer by a vapor deposition method. Accordingly, Applicants respectfully submit that the metal forming limitations and order of forming the laminate materially affect the final product and clearly differentiate the claims from the teachings of the applied references.

According to teachings of the applied references, such Watanabe and Summers, after applying a polymer coupling agent containing Si on the surface of a metallic foil, a precursor solution of polyimide is applied and cured on this coupling agent. Accordingly, under these circumstances, molecules of the coupling agent, such as those including the Si (or Ti or Al), merely adhere on the surface of the metallic foil and thus do not permeate or project into the inside of the metallic foil.

Next, the polyimide film is finally formed under a condition that the polymeric coupling agent adhering to the metallic foil comes into contact with the precursor of polyimide. Because the coupling agents disclosed in the applied references are polymers, and similarly the precursor of polyimide is a polymer, the adhesion of this system is limited because these polymers only contact each other at an interfacial surface between the coupling agent and the precursor of polyimide. Thus, number of contact sites where intermolecular interactions occur giving rise to adhesion is significantly limited. Therefore, because of the size of the polymer molecules the reactivity and amount of intermolecular interactions between (1) the coupling agent of the applied references and the precursor of polyimide and (2) the coupling agent of the applied references and the metal layer, are lowered due to a steric hindrance problem. Accordingly, because of limited interactions giving rise to adhesion due to the large size of molecules, the adhesive property obtained between the metal layer and the polyimide film of the applied references is deteriorated. The applied references

fail to recognize that the above problem causes a significant decrease in the adhesion and also provide no guidance regarding how to overcome the above problem.

It is the inventors of the claimed invention that discovered the above source of the problem solved by the claimed invention. Specifically, when comparing the molecular size of the precursor of polyimide with the size of the metal atom that is deposited during formation of the metal layer by vapor deposition, it is very clear that the metal atom is significantly smaller than the precursor of polyimide. Thus, with respect to claim 1, because the metal layer is formed by a vapor deposition method after adhering the at least one or more kind of element selected from Si, Ti, and Al contained in an organic substance to the thermoplastic film layer, a distinct structural feature results in that the metal is effectively deposited in the spaces or gaps around molecules of the organic substance (containing the at least one or more kind of element selected from Si, Ti, and Al) so that these molecules exist from the surface of the thermoplastic film layer and even project toward the inside of the metal layer that is formed on the thermoplastic film layer by a vapor deposition method.

Specifically, when the metal layer is formed by the vapor deposition method after adhering the at least one or more kind of element selected from Si, Ti, and Al contained in an organic substance to the thermoplastic film layer, steric hindrance does not preclude the metal atoms from penetrating and reaching (during the vapor deposition method) significantly more of the intermolecular gaps between the organic substances (containing the at least one or more kind of element selected from Si, Ti, and Al) that are adhered to thermoplastic film layer. Thus, by employing a technique that exploits the ability of the small metal atoms to enter and be deposited in these spaces (which result from adhering the at least one or more kind of element selected from Si, Ti, and Al contained in an organic substance to the thermoplastic film layer), more contact and points of intermolecular interaction are created during film formation by the vapor deposition method. Thus, improved contact and greater reactivity are

afforded by the claimed features thereby increasing the adhesive strength. Thus, the product-by-process steps of claim 1, result in distinct structural features to the final product, which are not taught or suggested by the applied references.

Section 2113 of the MPEP states that "[t]he structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product." *See, e.g., In re Garnero*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979). Therefore, in accordance with Section 2113 of the MPEP, the product-by-process features of claim 1 must be given patentable weight.

Moreover, because the metal atoms penetrate into gaps between the organic substances (containing at least one or more kind of element selected from Si, Ti, and Al) adhered to the thermoplastic film layer during the vapor deposition method, the final product achieves a structure where the organic substance (containing at least one or more kind of element selected from Si, Ti, and Al) projects into the metal layer like wedges and "exists from joining interface toward the metal layer," as recited in claim 1. This features allows the adhesion between the thermoplastic film layer and the metal layer to significantly increase. Such structural features are not taught or suggested by the applied references nor is there any guidance, reason or rationale provided on the record or in the applied references that would led one of ordinary skill in the art to achieve such features.

For at least these reasons, the metal forming limitations and order of forming the laminate materially affect the claimed product in a manner that was unappreciated by the Office Action and clearly differentiates the claims from the teachings of the applied references. Accordingly, for at least the reasons discussed above and those discussed in the

Amendment filed March 16, 2009, the applied references fail to teach, suggest, or establish any reason or rationale to provide, such a combination of features as recited in claim 1.

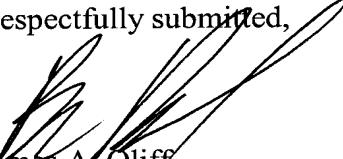
For similar reasons as discussed above, the process steps of claim 8 ("forming the metal layer on the thermoplastic film layer by a vapor deposition method, wherein before the metal layer is formed, an organic substance containing at least one or one kind of element selected from Si, Ti, and Al is deposited on the thermoplastic film layer") are neither suggested, nor do the applied reference establish any reason or rationale to provide such a combination of features.

Accordingly, for at least the foregoing reasons, Applicants respectfully submit that claims 1 and 8 would not have been rendered obvious by the applied references. Therefore, claims 1 and 8 and their dependent claims are patentable. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the application are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

James A. Oliff
Registration No. 27,075

Benjamin S. Prebyl
Registration No. 60,256

JAO:BSP/mkg

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OLIFF & BERRIDGE, PLC
P.O. Box 320850
Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

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